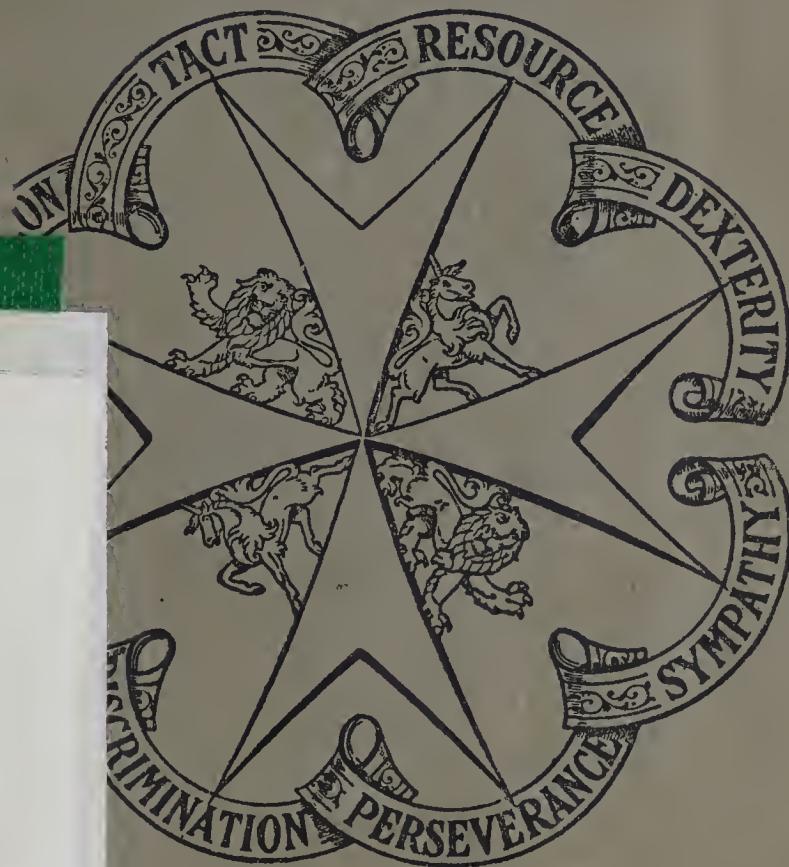


A PRELIMINARY COURSE
OF
FIRST AID
TO THE INJURED



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A PRELIMINARY COURSE
OF
FIRST AID TO THE
INJURED

BASED ON THE 39TH EDITION OF
THE AUTHORIZED TEXTBOOK OF THE
ST. JOHN AMBULANCE ASSOCIATION

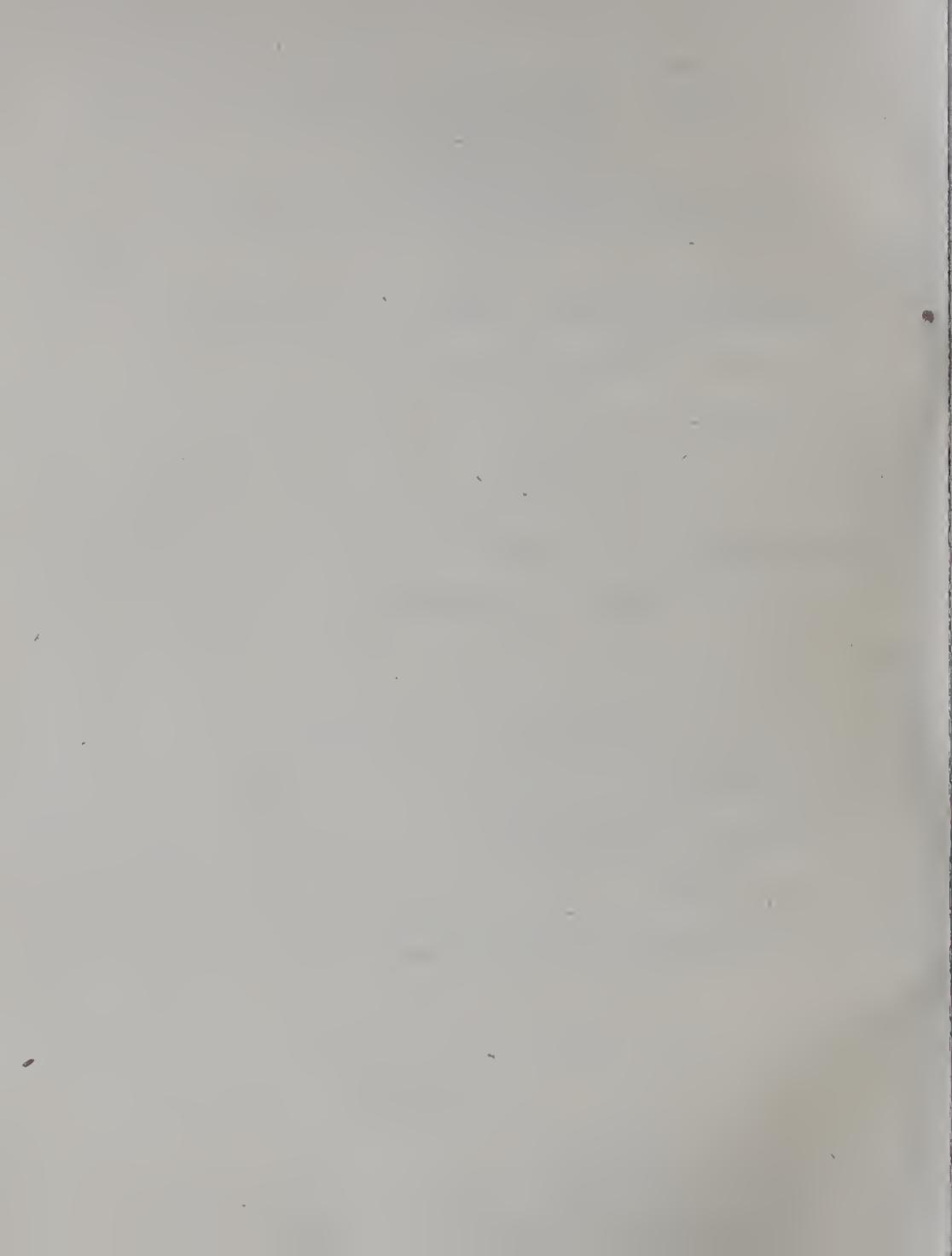
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INTRODUCTION

THE St. John Ambulance Association was founded by the Venerable Order of the Hospital of St. John of Jerusalem in 1877, and in the following year published its first textbook on First Aid to the Injured.

In 1922 the Association brought out this simple manual known as "A Preliminary Course of First Aid," for the use of juveniles and those adults who might not have the opportunity to study the standard course. This simple course, based as it is on the standard textbook, and as its name implies, may be regarded as a useful preliminary to the study of the standard course at a later date. In the meanwhile, those who have studied the book and have been successful at the subsequent examination for the Preliminary Certificate will have acquired sufficient knowledge to enable them to render useful assistance in an emergency.

CHAPTER I

FIRST AID—WHAT IT IS

First Aid to the Injured is the application of simple rules, based on the principles of practical medicine and surgery, before the arrival of a doctor. The objects of First Aid are :—

1. To PRESERVE the life of the patient.
2. To PROMOTE recovery.
3. To PREVENT the aggravation of the injury or condition.

The First-Aider must always remember that he is not a doctor, and that his duty is strictly limited to giving prompt help to meet the immediate needs of the patient. A DOCTOR'S HELP should be obtained AT THE EARLIEST POSSIBLE MOMENT, and, when sending for him, he should be informed of the most important particulars of the case, if possible in writing.

It must always be remembered that whatever the injury, SHOCK will be present in a greater or less degree, and, in cases where shock is severe, the patient may die as a result of it. The best remedies for shock are WARMTH, FRESH AIR and REST, so that in every case of injury this treatment must be given in addition to the treatment required for the particular type of injury or illness.

In cases of accident, it seems the natural impulse on the part of nearly everybody to raise a patient's head. This

should never be done thoughtlessly, though, as will be seen later, it is at times the right thing to do. A safe rule is: Do not raise a patient's head while his face is pale, but turn it to one side, taking care that the mouth and nose are uncovered. Another equally sound rule is: Do not thoughtlessly alter the position assumed by the patient, whether voluntarily or by force of circumstances.

If the patient is not breathing, breathing must be restored or he will surely die. If blood is spurting from a wound and bleeding is not stopped, the patient will bleed to death. Therefore, stopped breathing or severe bleeding must receive the first attention, no matter what are the other injuries.

The use of stimulants may prove very injurious. Spirits or any form of alcoholic stimulant should not be given without a doctor's orders. Hot drinks, such as milk, strong tea, or coffee are much safer. A drink of cold water is refreshing and often acts as a stimulant, while sprinkling the face with hot and cold water alternately is frequently beneficial.

Before any treatment can be given, it is necessary to find out what is the matter with the patient. Note, therefore, anything unusual about the patient or his surroundings, and hear what the bystanders can tell you. Learn from the patient what you can about how he feels, where he is hurt, etc., though the information thus obtained is not so reliable as what you can see and find out yourself.

Having found out what is the matter, apply the treatment given later under the various headings, treating the rules laid down as a guide to be followed as nearly as possible with whatever is available.

GENERAL PRINCIPLES OF FIRST AID

1. REMOVE THE CAUSE of the injury or danger, or, if this is not possible, remove the patient from the cause.
2. SEVERE BLEEDING must receive immediate attention, no matter what other injuries may be present.
3. AIR.—If the patient is not breathing, immediate steps must be taken to restore it. See that the air passages are free from obstruction, and that there is an abundance of pure air.
4. WARMTH.—Keep the patient warm by wrapping him in blankets, coats or rugs, and by applying hot water bottles to the body. Hot water bottles must be wrapped in flannel and the heat tested on the bare elbow.
5. REST.—A restful position of the body will greatly assist the patient, but the position assumed by him must not be thoughtlessly altered. With but very few exceptions, rest—of the body, of the affected part, and of the mind—is Nature's sovereign remedy.
6. WHEN A BONE IS BROKEN no attempt should be made to move the patient until the bone has been treated. In cases of extreme need, however, such as may result from danger due to the patient's position (*e.g.*, lying in front of an approaching train), he must be moved. If, however, it is practicable to remove the danger, for example, by holding up the traffic, this should be done in preference to moving the patient until he has received the attention immediately needed.
7. REMOVAL OF CLOTHING.—Uncover the patient as little as possible, since exposure increases shock.

CHAPTER II

DRESSINGS AND BANDAGES

DRESSINGS

A dressing is a covering applied to a wound or to an injured part.

The dressings used in First Aid are :—

1. Dry Dressing.—This is used to prevent contamination, to protect a wound, to promote healing, or to help in the application of correct pressure. The most reliable dressing for all wounds consists of a sterilised (germ-free) piece of gauze or lint stitched to a bandage ; this dressing is enclosed and sealed in a waxed paper covering ; this package is enclosed in an outer envelope, on which are printed the directions for use.

If a sterilised dressing is not available, the wound may be covered with a piece of clean gauze or lint or boracic lint.

In an emergency a perfectly clean handkerchief or piece of linen or clean unprinted paper, such as the inside of an envelope, may be used, but their use is only temporary until a sterilised dressing is available ; whenever possible, the improvised dressing should be soaked in an antiseptic solution (see page 46) and wrung dry.

2. Wet Dressings.—

(a) **A cold compress** is used to ease pain, to lessen swelling, or to control internal bleeding. A clean

handkerchief or piece of lint, four folds in thickness, is soaked in cold water, wrung out until it does not drip when held up, and applied to the affected part. It must be frequently changed in order to keep it cold and wet.

(b) A **hot compress** is used to ease pain. A piece of flannel or lint, four folds in thickness, is soaked in very hot water, wrung dry, and applied to the affected part. As it is important to retain the heat as long as possible, it should be covered with a piece of jaconet, oiled silk or grease-proof paper larger than the compress. It must be renewed as soon as it cools.

All First Aid dressings, except the cold compress, should be covered with cotton wool and kept in place by a bandage.

BANDAGES

Bandages form an important part of First Aid treatment, the **Triangular Bandage** being generally used.

It may be applied :—

1. To retain splints or dressings in position.
2. To afford support to an injured part, or as an arm sling.
3. To make pressure and so reduce or prevent swelling.

Triangular Bandages (Fig. 1) are made by cutting a piece of linen or calico 40 ins. square diagonally into two pieces.

A Broad Bandage is made by bringing the point down to the base (Fig. 2) and then folding into two (Fig. 3).

A Narrow Bandage is made by folding the broad bandage once (Fig. 4).

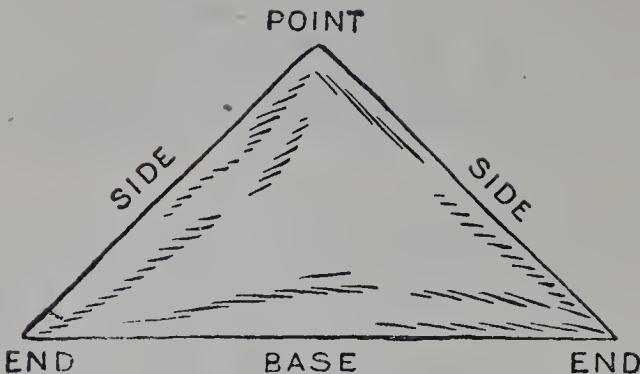


FIG. 1—BANDAGE SPREAD OUT

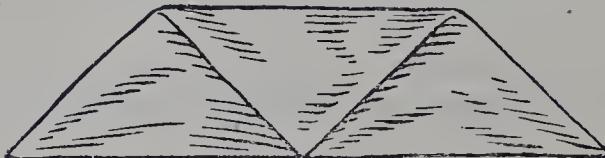


FIG. 2—BANDAGE ONCE FOLDED



FIG. 3—BROAD BANDAGE

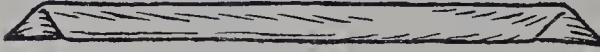


FIG. 4—NARROW BANDAGE

It is sometimes advisable to halve the size of the triangular bandage by bringing the two ends together before folding it into the broad or narrow bandage.

To secure the ends of a Triangular Bandage **Reef Knots** (Fig. 5) should be used. Granny knots (Fig. 6) are apt to slip and must be avoided. After the reef knot is completed, the ends of the bandage should be tucked in.

Bandages may be improvised from handkerchiefs, belts, straps, braces, neckties, or any piece of linen, calico, tape or cord that comes to hand.



FIG. 5—REEF KNOT



FIG. 6—GRANNY KNOT

Large Arm Sling (Fig. 7).—This supports the forearm



FIG. 7—LARGE ARM SLING



FIG. 8—SMALL ARM SLING

and hand. Spread out a triangular bandage, put one end over the shoulder on the sound side, pass it round the neck so that it appears over the shoulder on the injured side, and let the other end hang down in front of the chest ; carry the point behind the elbow of the injured limb, and place the forearm over the middle of the bandage ; then carry the second end up to the first and tie them ; bring the point forward, and secure with two pins to the front of the bandage.

Small Arm Sling (Fig. 8).—This supports the wrist and hand, but allows the elbow to hang freely. Place one end of a broad bandage over the shoulder on the sound side, pass it round the neck so that it appears over the shoulder of the injured side ; place the wrist over the middle of the bandage so that the front edge covers the base of the little finger ; then bring the second up to the first, and tie them.

St. John Sling.—This keeps the hand well raised. (The instructions apply in the case of an injury on the left side. When the injury is on the right side, substitute the word “left” for “right” and “right” for “left.”)

(a) Place the patient’s left forearm diagonally across the chest so that his fingers point towards the right shoulder and the palm rests on the breast-bone.

(b) Holding an unfolded bandage with its point in the right hand and one end in the left hand, lay the



FIG. 9



FIG. 11

FIG. 10



ST. JOHN SLING

bandage over the left forearm with the point well beyond the elbow, and the end in the left hand on the right shoulder (Fig. 9).

(c) Whilst supporting the left elbow, tuck the base of the bandage well under the left hand and forearm and carry the lower end across the back to the right shoulder, allowing the point to hang loosely outwards ; tie the ends in the hollow above the right collar-bone.

(d) With your left hand hold open the side of the bandage lying on the left forearm, and with your right hand tuck the point well in between the left forearm and the side of the bandage which you are holding open.

(e) Carry the resulting fold round over the back of the arm, and firmly pin it to a part of the bandage, running up the back (Figs. 10 and 11).



FIG. 12

BANDAGE FOR SCALP

Slings may be improvised in many simple ways, such as by pinning the sleeve to the clothing, turning up the lower edge of the coat, passing the hand inside the buttoned coat or waistcoat, etc.

APPLICATION OF BANDAGES

For the Scalp (Fig. 12).—Fold a hem inwards about $1\frac{1}{2}$ inches deep along the base of a bandage ; place the band-

age on the head so that the hem lies on the forehead **close down to the eyebrows**, and the point hangs down at the back ; carry the two ends round the head above the ears and tie them on the forehead so as to secure the lower border of the bandage ; steady the head with one hand and with the other draw the point of the bandage downwards ; then turn it up and pin it to the bandage on the top of the head.

For the Forehead, Side of the Head, Eye, Cheek, and for any part of the body that is round (as the arm or thigh, etc.), the narrow bandage should be used, its centre being placed over the dressing, and the ends carried round the head or limb, as the case may be, and tied.

For the Shoulder (Fig. 13).—Place the centre of a bandage on the shoulder, with the point running up the side of the neck ; fold a hem inwards along the base ; carry the ends round the middle of the arm and tie them, so as to secure the lower border of the bandage. Apply a small arm sling. Turn down the point of the first bandage over the knot of the sling, draw it tight and pin it.

For the Hip (Fig. 14).—Tie a narrow bandage round the body above the haunch-bones, with the knot on the injured side. Carry the point of a second bandage under the first bandage and turn it down over the knot. Fold a hem inwards according to the size of the patient along the base of the second bandage ; carry the ends round the thigh and tie them so as to secure the lower border of the bandage ; fix the point of the bandage with a safety pin.



FIG. 13
BANDAGE FOR SHOULDER

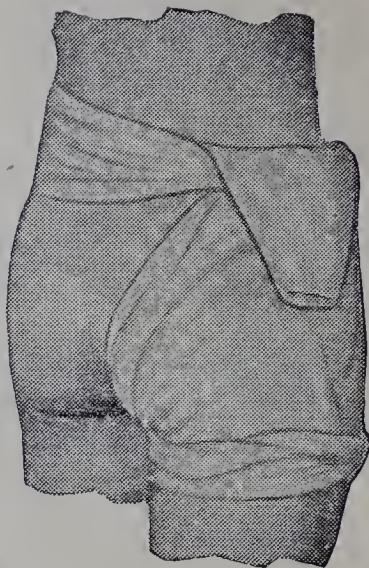


FIG. 14
BANDAGE FOR HIP



FIG. 15
BANDAGE FOR HAND

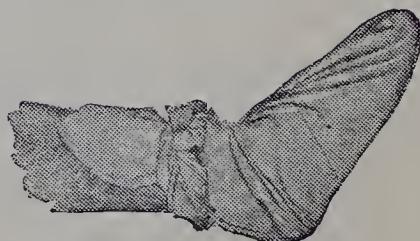


FIG. 16
BANDAGE FOR FOOT

For the Hand when the fingers are extended (Fig. 15).—Fold a hem inwards along the base of a bandage ; place the injured surface on the bandage with the wrist on the hem and the fingers towards the point ; then bring the point over the wrist, pass the ends round the wrist, cross and tie them ; bring the point over the knot and pin it to the bandage over the hand. Apply a large arm sling.

For the Foot (Fig. 16).—Place the foot on the centre of the bandage with the toes towards the point ; draw up the point over the instep, bring the ends forward and cross them ; pass the ends round the ankle and tie them. Draw the point forward and pin it to the bandage over the instep.

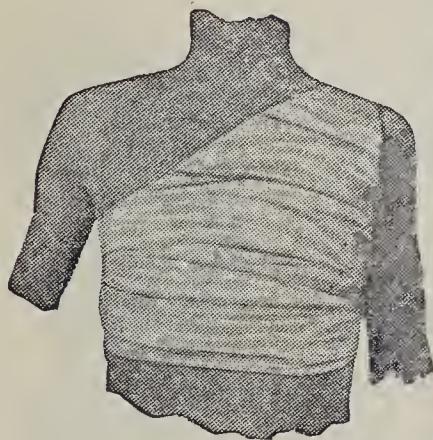


FIG. 17

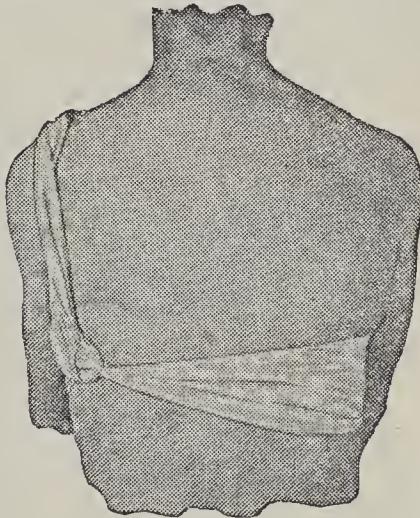


FIG. 18

BANDAGE FOR CHEST
(Front and Back Views)

For the Front of the Chest (Figs. 17 and 18).—Place the middle of the bandage over the dressing with the point

over the shoulder on the same side ; fold a 3-inch hem along the base of the bandage, carry the ends round the waist and tie them, leaving one end longer than the other ; then draw the point over the shoulder and tie it to the longer end.

For the Back.—The bandage is applied as the foregoing except that it is begun at the back.

For the Elbow (Fig. 19).—Bend the elbow. Fold a narrow hem inwards along the base of a bandage ; lay the point on the back of the arm and the middle of the base on the back of the forearm ; cross the ends first in front of the elbow, then round the arm and tie them. Bring the point down and pin it.



FIG. 19—BANDAGE FOR ELBOW

For the Knee (Fig. 20).—Bend the knee. Fold a narrow hem inwards along the base of a bandage ; lay the point on the thigh and the middle of the base just below the knee-cap ; cross the ends first behind the knee, then round the thigh and tie them. Bring the point down and pin it to the base.



FIG. 20
BANDAGE FOR KNEE

When not in use the triangular bandage should be folded narrow; the two ends should be turned to the centre, and the bandage then folded into four, reducing it to a packet about $6\frac{1}{2}$ inches by $3\frac{1}{2}$ inches.

CHAPTER III

STRUCTURE OF THE BODY

THE SKELETON

The human body consists of the head, the neck, the trunk (often spoken of as the body), the two upper limbs and the two lower limbs, and is supported upon a framework composed of a number of bones which together form what is called the skeleton. When the terms "upper" and "lower," "front" and "back" are used, they refer to a person supposed to be standing up facing the First-Aider with his arms hanging down by the side and the palms of the hands directed forwards.

THE BONES OF THE HEAD

The bones of the head (Fig. 21) are, with the exception of the lower jaw, firmly joined together and form the skull. These bones enclose the brain and provide the framework for the face. The roof of the mouth is the palate, which separates it from the nostrils, but as the palate does not extend to the back of the throat there is communication between the nostrils and the mouth. The top of the skull is called the vault or dome. The temples are the flat sides of the skull (on a level with the eyes) above the bony ridges known as the cheek bones. The base of the skull rests upon the uppermost bone of the spine at a point where the nodding movement of the head takes place.

THE BONES OF THE NECK AND TRUNK

The Spine (back-bone) extends from the base of the skull to between the haunch-bones, and is composed of a number of bones, called "vertebrae" (Fig. 21). These bones are strapped together by strong bands called ligaments. The spinal cord, which is a continuation of the brain, and with it forms the great nerve centre of the body, is enclosed within the spine. It is the presence of the spinal cord within the spine that renders a broken back such an extremely serious injury.

The Ribs are twelve pairs of curved bones extending forward from the spine to the front of the body and are known by numbers, counting downwards. The ribs surround the chest and serve to protect the lungs, heart, liver, stomach, etc.

The Breast-bone is shaped like a dagger with its point downwards, and is attached by gristle to the upper seven pairs of ribs.

The Pelvis is formed by the two Haunch-bones, which meet in front and are firmly joined behind with the lower part of the spine, which is placed between them. They are provided with sockets to receive the heads of the thigh-bones at the hip-joints. The Pelvis supports the abdomen and its contents.

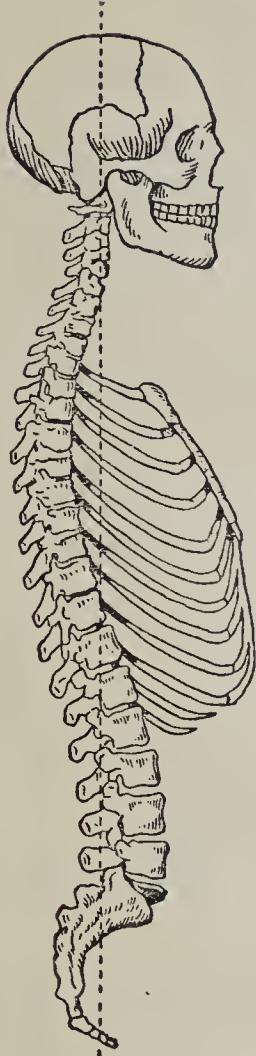


FIG. 21

SKULL AND SPINE

Showing left ribs and portion of breast-bone.

The right ribs are removed.

THE BONES OF THE UPPER LIMBS

The bones of the shoulder are the Collar-bone and the Shoulder-blade.

The Collar-bone is about the thickness of the finger, and can be felt beneath the skin at the lower and front part of the neck. The inner end rests on the upper part of the breast-bone and its outer end forms a joint with the shoulder-blade. The Shoulder-blade lies at the upper and outer part of the back and forms a joint with the collar-bone and the bone of the arm.

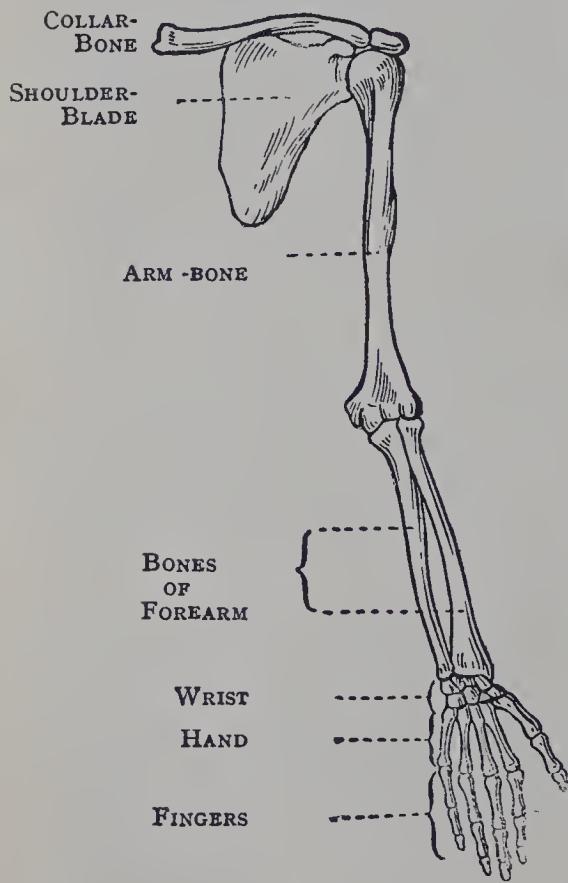


FIG. 22—BONES OF THE LEFT
UPPER LIMB

The bone of the Arm reaches from the shoulder to the elbow. In the Forearm are two bones which reach from the elbow to the small bones at the wrist. Beyond the wrist are the bones of the hand and fingers (Fig. 22).

THE BONES OF THE LOWER LIMBS

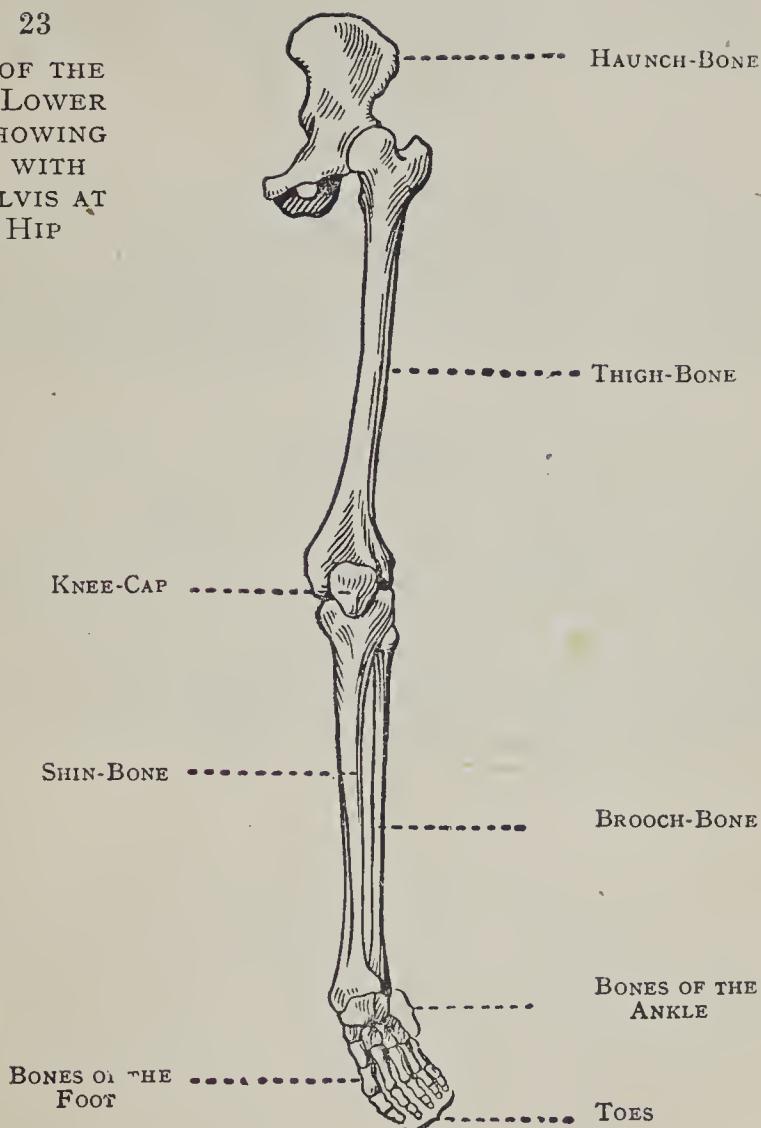
Each Thigh-bone reaches from the hip to the knee (Fig. 23).

The Knee-cap is a flat bone lying in front of the knee-joint.

The bones of the Leg are the Shin-bone and the Brooch-bone. The Shin-bone reaches from the knee to the ankle, beyond which

FIG. 23

BONES OF THE
LEFT LOWER
LIMB SHOWING
JOINT WITH
THE PELVIS AT
THE HIP



are the bones of the foot. The Brooch-bone lies on the outer side of the Shin-bone ; its upper end does not reach to the knee, but its lower end forms part of the ankle-joint.

JOINTS

Where bones meet a Joint is formed. In joints such as the hip, knee, elbow, etc., the ends of the bones are covered by gristle and wrapped in a case which supplies a fluid to lubricate the joint. Strong bands, called ligaments, hold the bones in position but allow of free movement.

MUSCLES

Muscles are the red flesh of the body and have the power of contracting, *i.e.*, getting shorter and thicker. A muscle is attached by its ends to different bones and passes over a joint. When a muscle shortens, one of the bones to which it is attached is moved. Should a bone be broken, the broken ends are often caused to overlap each other by the shortening of muscles.

CHAPTER IV

FRACTURES

Fracture is the term used when a bone is broken.

VARIETIES OF FRACTURE

Fractures may be :

1. **Simple.**—The bone is broken with slight injury to the surrounding parts.
2. **Compound.**—The bone is broken and there is a wound leading down to the seat of fracture by which dirt and germs may enter.
3. **Complicated.**—The bone is broken and some organ (for example, the brain, spinal cord, lung, etc.) or blood-vessel is injured.

A simple fracture may become compound or complicated (or both) as the result of careless movement or lack of support.

GENERAL SIGNS AND SYMPTOMS WHICH MAY BE PRESENT

1. Pain at or near the fracture.
2. The power of movement of the limb is reduced.
3. Swelling about the fracture. Swelling frequently renders it difficult to perceive other signs of fracture, and care must therefore be taken not to mistake a fracture for a less serious injury.
4. Deformity. The limb assumes an unnatural position, and is mis-shapen at the fracture.

OBJECT OF TREATMENT

The object of First Aid Treatment of Fractures is to guard against further injury or aggravation, especially to prevent a simple fracture from becoming compound or complicated.

GENERAL RULES FOR TREATMENT OF FRACTURES

1. Attend to the fracture on the spot unless the surroundings are such as threaten death or further injury. In a crowded thoroughfare the patient should be protected from the traffic, instead of being moved, until the injured limb has been secured by splints or other means of restraint. This rule applies with, if possible, greater force to the case of a broken back.
2. When severe bleeding is present, it must be attended to first, and the wound covered with a clean dressing (see page 46).
3. Cover the patient to keep him warm and to prevent shock.
4. With great care and without using force, place the limb in as natural a position as possible. In the case of a compound fracture when the bone has come through the skin, **do not attempt to pull it into place**. In all compound fractures cover the wound with a sterilised dressing, lint or clean linen.
5. Apply splints, bandages and slings when necessary, over the clothing as follows :—
 - (a) The splints must be firm, and long enough to keep the joints immediately above and below the fractured bone at rest.

(b) The bandages must be applied firmly, but not so tightly as to stop the circulation of blood in the limb. When the patient is lying down, double the bandage over a splint and, taking advantage of the natural hollows of the body, pass it under the trunk or lower limb.

In applying bandages near a fracture the upper one (that is, nearer the body) should be secured first.

(c) Slings when necessary should be applied as described in Chapter II.

6. Treat shock.

In all doubtful cases treat as a fracture.

SPLINTS

A splint may be improvised from a walking stick, umbrella, billiard cue, broom or brush handle, policeman's truncheon, rifle, folded coat, a piece of wood cardboard, a newspaper firmly folded, a rolled-up map, or, in fact, anything that is firm and long enough to keep the joints immediately above and below the broken bone at rest. When the above appliances are not available the upper limb, if fractured, may be tied to the body, and in all cases, a fractured lower limb should be bandaged to its fellow.

SPECIAL FRACTURES

Fracture of the Lower Jaw.—Pain, inability to speak and move the jaw freely, and bleeding from the gum usually accompany this injury.

TREATMENT

1. Place the palm of the hand below the injured bone and press it gently against the upper jaw.
2. Apply the centre of a narrow bandage under the chin, carry the ends over the top of the head and tie them.
3. Apply the centre of a narrow bandage in front of the chin, carry both ends backwards and tie at the back of the neck (Figs. 24 and 25).



FIG. 24
BANDAGE FOR FRACTURE OF LOWER JAW



4. Tie the ends of both bandages together.
5. If patient shows any indication of being about to vomit, remove bandages immediately, turn head to the sound side, and support the jaw with the palm of the

hand. Re-apply bandages when vomiting has completely ceased.

6. Treat shock.

Fracture of the Spine.—This very serious injury may be caused by the fall of a heavy weight upon the back, by falling from a height on the back across a bar or upon any uneven surface, while a fall on the head may cause a broken neck.

The great danger of a broken spine is injury to the spinal cord, which causes loss of feeling and the power of movement in all parts of the body below the seat of fracture.

TREATMENT

1. At once warn the patient to lie still.
2. Apply a bandage in the manner of the figure 8 round ankles and feet, the knot being tied under the soles of the feet. Apply broad bandages round the knees and round the thighs.
3. Cover the patient warmly.
4. Avoid moving him.
5. Send immediately for a doctor.

Fractured Ribs.—The patient will feel pain, especially on attempting to take a deep breath. His breathing will therefore be short and shallow.

TREATMENT

1. Lay the patient down, inclined towards the injured side.
2. Place the arm on the injured side in a large arm sling.

3. Send for a doctor.
4. Treat shock.

Fracture of the Collar-bone.—This fracture is frequently caused by a fall on the hand or shoulder. The arm on the injured side is partially helpless, and the patient usually supports it at the elbow with his hand, and inclines his head towards the injured side.

TREATMENT

1. Remove the coat and as much more of the clothing as is expedient. Unfasten a man's brace on the injured side.
2. Place in the armpit a pad about 2 inches thick, 2 inches broad, and 4 inches across.



FIG. 26—BANDAGE
FOR SIMPLE FRACTURE
OF COLLAR-BONE

3. Apply a St. John sling (see Figs. 9 to 11).
4. Secure the injured limb firmly to the side by a broad bandage passed round the elbow and trunk, so as to lever out and draw back the shoulder, the pad forming the fulcrum (Fig. 26).
5. Make sure that the pulse is present at the wrist ; if it is not, relax the bandage around the body.
6. Tighten the sling.
7. Treat shock.

Fracture of the Arm-bone.—All the general signs and symptoms of fracture are usually present.

TREATMENT

1. Seat the patient.
2. Place the forearm across the body, keeping the thumb uppermost.
3. Apply a small arm sling.
4. Apply splints, reaching from the shoulder to the elbow on the front, back and outer side of the arm in its present position.
5. Secure the splints by bandages above and below the fracture (Fig. 27). If splints are not available, or if the fracture is too high up for a bandage to be placed above it, secure the limb to the side by one or two broad bandages.
6. Treat shock.

Injuries at or near the elbow-joint are often accompanied with so much swelling as to make it difficult to determine their nature. The only treatment that should be attempted before the arrival of a doctor is to support the limb in the most comfortable position by a small arm sling or by resting



FIG. 27
TREATMENT OF
FRACTURE OF ARM

it on a pillow, and to apply a cold compress to the affected part.

Fracture of the Forearm.—

TREATMENT

1. Place the forearm across the chest at a right angle to the arm, keeping the thumb uppermost, and the palm of the hand towards the body.
2. Apply splints on the front and back of the forearm from the elbow to the fingers.



FIG. 28

TREATMENT OF FRACTURE OF FOREARM

Fracture of the Bones of the Hand or Fingers—Crushed Hand.—

TREATMENT

1. Apply a carefully padded splint to the front of the hand, reaching from well above the wrist to beyond the tips of the fingers.

3. Apply two bandages, embracing both splints ; one is placed above the fracture and the other round the wrist first and completed as a figure of 8 round the hand and wrist (Fig. 28).
4. Apply a large arm sling.
5. Treat shock.

2. To secure the splint apply a bandage crossed in the manner of the figure 8 to the hand and wrist, and a second bandage round the forearm (Fig. 29).
3. Apply a large arm sling.
4. Treat shock.



FIG. 29

TREATMENT OF CRUSHED HAND

Fracture of the Thigh-bone.—The thigh-bone may be broken at its neck, anywhere in the shaft, or close to the knee. In addition to the general signs and symptoms, a prominent sign of a broken thigh-bone is the position of the foot, which, as a rule, lies on its outer side. A fracture at the neck is likely to occur in old people from very slight cause.

TREATMENT

1. Steady the limb by holding the ankle and foot. Gently draw down the foot, bringing it into line with its fellow, and apply a bandage as a figure of 8 round the ankles and feet. (Fig. 30, bandage A).
2. Pass seven bandages under the patient in the following order :—

The chest, just below the armpits (B).

The pelvis, in line with the hip-joints (C).

Both ankles and feet (D). This covers bandage A.
 Both thighs, above the fracture (E).
 Both thighs, below the fracture (F).
 Both legs (G).
 Both knees (H) (a broad bandage).

B C E F H G (A) D

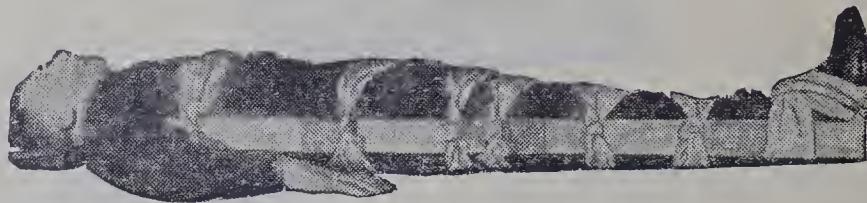


FIG. 30

TREATMENT OF FRACTURE OF THIGH-BONE

3. Place a splint along the injured side of the patient from the armpit to just beyond the foot.

4. Secure the splint by tying the bandages in the same order. All the bandages should be tied over the splint except D, which should be applied as a figure of 8 and tied under the soles of the feet.

5. Treat shock.

Fracture of the Knee-cap.—When the foot slips, in the attempt to prevent a fall, the muscles in the front of the thigh sometimes act with such force as to snap the knee-cap in two; also a direct injury to this bone may break it.

Pain, the limb quite helpless, and a gap which may be felt between the broken fragments usually denote this injury.

TREATMENT

1. Lay the patient on his back, raise well and support the head and shoulders, straighten and raise the limb.
2. Apply a splint along the back of the limb, reaching from the buttock to beyond the heel. The splint must be well padded under the natural hollow of the leg so as to raise the heel from the splint.
3. Secure the splint by bandages round the thigh (A) and leg (B) (Fig. 31).

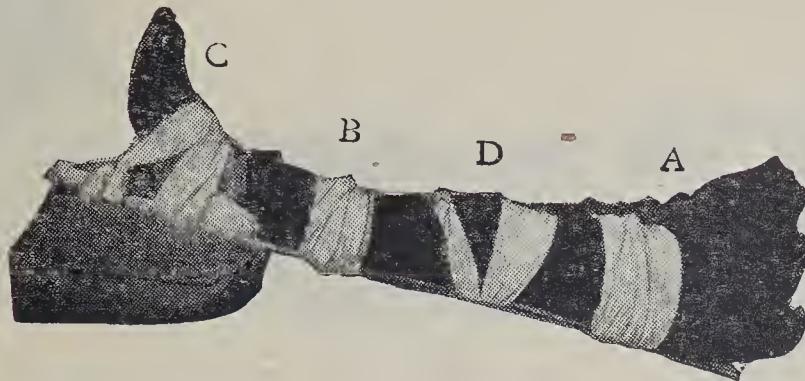


FIG. 31

TREATMENT OF FRACTURE OF KNEE-CAP

4. Secure the foot by a double figure of 8 bandage round splint, ankle, foot and splint, tying on top of the splint below the foot (C).
5. Support the foot well off the ground by a pillow, roll of clothing, or rugs.
6. Apply a narrow bandage with its centre immediately above the knee-cap, cross the ends behind over the splint, pass them again to the front of the limb just below the knee-cap and tie them.

7. Apply a cold compress over the fracture to lessen swelling of the joint.

8. Treat shock.

Fracture of the Leg.—One or both of the bones may be broken. A fracture of the brooch-bone three or four inches above its lower end is frequently mistaken for a sprained ankle.

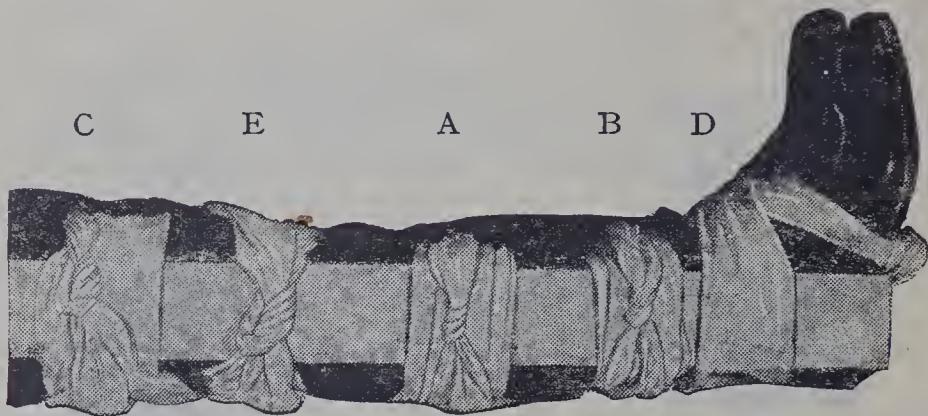


FIG. 32
TREATMENT OF FRACTURE OF LEG

TREATMENT

1. Steady the limb by holding the ankle and foot.
2. Draw the foot into its natural position, and do not let go until the splints have been fixed.
3. Apply splints on the outer and inner sides of the leg, reaching from above the knee to beyond the foot. If only one splint is available, place it on the outer side.
4. Secure the splints by bandages (A) above, (B) below the fracture, (C) immediately above the knee, (D) round

ankles and feet as a figure of 8, (E) a broad bandage round both knees (Fig. 32).

5. Treat shock.

Fracture of the Bones of the Foot or Toes—Crushed Foot.—This injury is commonly caused by the passage of a heavy weight over the foot, and may be recognised by pain, swelling, and loss of power.

TREATMENT

1. Remove the boot and stocking.

2. Apply a carefully-padded splint to the sole of the foot, reaching from the heel to the toes.

3. Apply the centre of a narrow bandage over the instep, crossing it after the manner of the figure of 8 as shown in Fig. 33, tying it off on the splint.

4. Support the foot in a slightly raised position.

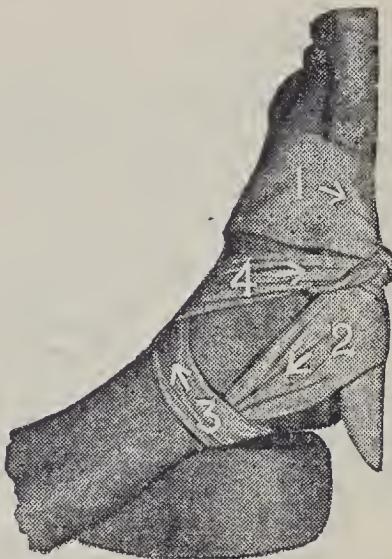


FIG. 33
TREATMENT OF
CRUSHED FOOT

CHAPTER V

INJURIES TO JOINTS AND MUSCLES

DISLOCATIONS

A dislocation is the displacement of a bone at a joint, usually caused by a wrench or jar (see Fig. 34).

TREATMENT

No attempt should be made by anyone except a doctor to put the bone back into its place.

1. Steady and support the limb in whatever position gives most ease, using padding where necessary to lessen the effects of jolting during transport.

2. Apply ice or a cold compress to the joint, and if this ceases to give relief, apply a hot compress.

3. Treat shock.



FIG. 34

DISLOCATION OF ELBOW

SPRAINS

When, by a sudden wrench or twist, *the ligaments and the parts around a joint* are stretched or torn, the joint is said to be sprained.

SIGNS AND SYMPTOMS

1. Pain at the joint.
2. Inability to use the joint without increasing the pain.
3. Swelling and, later, discoloration.

TREATMENT

1. Place the limb in the most comfortable position and prevent any movement.
2. Expose the joint and apply a firm bandage.
3. Wet the bandage with cold water and keep it wet.
4. When this ceases to give relief, take the bandage off and re-apply it.

In all doubtful cases, treat as a fracture.

CHAPTER VI

CIRCULATION OF THE BLOOD

The circulation of the blood is carried out by the heart and blood vessels. The heart is in the chest slightly to the left. It alternately contracts and expands about seventy to eighty times a minute, by which means blood constantly enters it and is forced from it to all parts of the body through blood vessels called arteries. This causes the pulse, which may most easily be felt at the front of the wrist on the thumb-side.

The main artery leaving the heart is a large vessel, which divides into a number of smaller branches, which in turn sub-divide into still smaller branches until eventually they become so small as to be invisible to the naked eye. A prick with a needle would pierce several of them. These very small vessels are called capillaries, which unite and thus become larger and larger until they cease to be capillaries and become veins. The veins become larger and larger as they join each other, and eventually reach the heart as large blood vessels, carrying blood collected from all over the body.

If enough pressure is made upon an artery the flow of blood in it will be stopped at the point where pressure is made. Furthermore, as arteries are the only vessels that carry blood from the heart to any part of the body (say the hand), stopping the supply of arterial blood to the hand will make it impossible for blood to continue to

flow back to the heart *from* the hand. Owing, however, to the manner in which the blood vessels join each other, some blood will reach the hand, although the flow of blood through the main artery of the arm has been stopped. Bleeding from the hand would be much reduced by pressure on the main artery of the arm, but direct pressure on the wound is what should, in most cases, be relied upon to stop bleeding.

Another lesson to be learnt from the circulation of the blood is that any poison or germs that find their way into a blood vessel will, unless rapid measures are taken to stop them, be carried to the heart and distributed about the body. For this reason do all you possibly can to prevent dirt from getting into a wound, and if any poison has got in as the result, for example, of a dog bite, apply a ligature (such as a piece of tape) between the wound and the heart.

CHAPTER VII

WOUNDS AND BLEEDING

In the treatment of wounds, it is necessary :—

1. To stop the bleeding.
2. To lessen the effects of shock.
3. To protect the wound against the entry of harmful germs.

As a clot of blood is Nature's method of stopping bleeding; it should never be disturbed. It serves the double purpose of keeping the blood in and germs out.

GERMS

The air and all our surroundings teem with minute germs, which multiply with extreme rapidity. Some of them, when they gain admission to the body, are capable of causing very serious diseases. The skin, as long as it is uninjured, guards against their entry, but the moment it is wounded they can get in. If the wound is kept perfectly clean, it will heal much better and with far less risk of disease.

It is very easy to introduce germs into a wound, however small ;

(a) By unnecessarily touching it or the dressing which is to be applied unless the hands are perfectly clean and have been made sterile by the application of an **antiseptic**. An antiseptic is a chemical substance

which has the power of restraining the development of germs. Antiseptics which do not stain, burn, or irritate, and which are not poisonous, are preferable. If these are not available, normal saline solution (one teaspoonful of salt to a pint of sterile water) may be used.

- (b) By washing it with water which has not been rendered sterile by being boiled and allowed to cool, or by the addition of an antiseptic.
- (c) By leaving it exposed to the air.
- (d) By the application of sticking plaster or ointment.

To ensure as far as possible the cleanliness of all dressings used :—

1. Spread out a clean handkerchief, triangular bandage or towel and on it place all the necessary material.
2. (a) If using a sterilised dressing, remove the outer envelope, sterilise the fingers and open the inner package, remove the dressing, taking care to expose it as little as possible to the air, and avoid fingering the surface of the dressing. After sterilising the fingers, care *must* be taken not to handle anything which is not clean.
(b) If a sterilised dressing is not available, sterilise the fingers, cut a piece of clean gauze, lint, or boracic lint to the required size and apply to the wound. Avoid touching the side of the dressing which is placed next to the wound.
3. After the dressing is completed, again sterilise the fingers and replace the unused dressings in a clean container.

GENERAL RULES FOR TREATMENT OF A WOUND WHEN
BLEEDING IS SLIGHT
("CAPILLARY")

1. Expose the wound, removing whatever clothing may be necessary. Do not disturb any blood-clots.
2. Remove broken glass, bits of clothing, hair, etc., seen lying loose in the wound; do not search for what you suspect but cannot see.
3. If the wound is obviously dirty, wash away as much of the dirt as possible by gently pouring sterilised water over it freely.
4. Apply an antiseptic all over the wound and the surrounding skin, and cover with a dry dressing.
5. Cover the dressing with cotton wool, lint, or other soft material.
6. Apply a bandage to secure the dressing.
7. Support the injured part.
8. Treat shock.

GENERAL RULES FOR TREATMENT OF A WOUND WHEN
BLEEDING IS SEVERE AND SPURTING ("ARTERIAL")

1. Place the patient in a suitable position, bearing in mind that blood escapes with less force when the patient sits, and is still more checked when he lies down.
2. If the wound is in a limb, raise the limb unless a bone is broken.
3. Expose the wound, removing only whatever clothing may be necessary. Do not disturb any blood-clots.

4. Immediately apply pressure with the thumb or fingers (digital pressure), either :--
 - (a) Directly on the bleeding spot (direct digital pressure). Direct digital pressure must not be made over a fracture or a foreign body ; or
 - (b) If the wound is large, or if a fracture or foreign body is suspected, on a point known as the pressure point, as near as possible to the wound on the heart side, where the artery can be pressed against the underlying bone (indirect digital pressure). When making indirect digital pressure avoid crooking the thumbs or fingers and digging the tips into the part. (Pressure points, see pages 52 to 56.)
5. As soon as practicable, substitute for digital pressure a pad and bandage, or, if necessary, a tourniquet (see page 50), on the pressure point while the wound is being examined and treated.
6. Remove any foreign bodies, such as broken glass, bits of clothing, hair, which can be seen lying loose in the wound ; do not search for foreign bodies which cannot be seen.
7. If the wound is obviously dirty, and medical aid cannot be procured, wash away as much of the dirt as possible by gently pouring sterilised water freely over it. Never wash the surrounding parts towards a wound.
8. Apply an antiseptic all over the wound and the surrounding skin, and cover with a dry dressing.
9. Cover the dressing with cotton wool, lint, or other soft material.

10. Apply a bandage over the dressing firmly ; but if the presence of a foreign body or fracture is suspected apply it lightly.

11. Relax indirect pressure and note whether bleeding has ceased.

12. Afford support to the injured part.

13. Treat shock.

TO IMPROVISE AND APPLY A TOURNIQUET

(a) Apply a firm pad on the pressure point nearest the wound on the heart side. The artery of the arm (page 54) or the artery of the thigh (page 55) are the main points.

(b) Encircle the limb by a narrow bandage, strap or cord with its centre over the pad, and tie the ends in a half knot on the opposite side.

(c) Lay a short stick, pencil, or other similar thing on the half knot, and over it tie a reef knot.

(d) Twist the stick to tighten the bandage.

(e) Lock the stick in position by the ends of the bandage already applied, or by another bandage passed round the stick and limb.

The pad of the tourniquet must be accurately placed upon the pressure point so as completely to compress the artery.

Should a suitable pad not be at hand, make a knot in the middle of the bandage, and enclose a stone, cork, etc., if available, in the knot.

As the tourniquet is being tightened, digital pressure should be released for a moment to make sure that the

pressure of the tourniquet is sufficient to stop the bleeding, and re-applied while the tourniquet is being tightened if it is not.

The tourniquet must be tightened enough to stop the bleeding *and no more*. If the tourniquet is not tightened sufficiently, it will make matters worse by producing congestion of the limb and increased bleeding.

The tourniquet must not be kept tightened too long. If medical aid is not available after twenty minutes, slacken it and, if bleeding has stopped, leave it slack. If, however, sharp bleeding recommences, at once re-apply the tourniquet. Repeat this procedure, if necessary, after another twenty minutes.

After the tourniquet has been slackened, watch the dressing carefully to see that bleeding does not begin again. If it does, tighten the tourniquet immediately.

THE ST. JOHN TOURNIQUET.

The St. John tourniquet (Fig. 35) consists of a piece of webbing two inches wide (B), provided with a buckle (D), pad (A); and twister (C), over the pad.

To use the tourniquet :—

1. Place the rounded side of the pad (A) on the pressure point (brachial or femoral artery as the case may be).

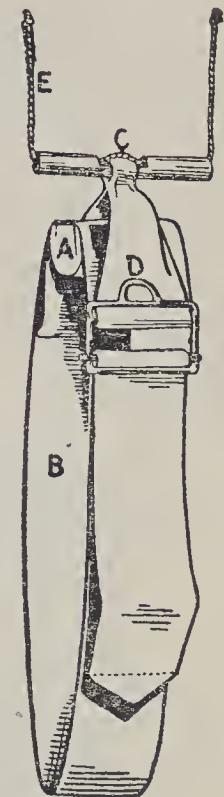


FIG. 35

- A. Pad
- B. Webbing
- C. Twister
- D. Buckle
- E. String

2. To adjust the tourniquet. After encircling the limb, pass the pointed end of the strap (B) from underneath upwards between the sliding bar and the fixed webbing. Pass the pointed end downwards between the sliding bar and the outer bar of the buckle and pull it tight.

3. After noting that the pad is in the correct position, apply sufficient pressure by means of the twister (C) to arrest haemorrhage. The twister should be kept as near the centre of the pad as possible. Should moderate pressure fail to arrest haemorrhage, it may be assumed that the pad is incorrectly placed.

4. Pass the appropriate end of the string (E) which runs freely within the cane, through the "D" attached to the buckle, and tie it. To ensure ease in relaxing pressure, the hitch or knot securing the string should be finished with a loop.

5. To undo the buckle. Draw the ends of the sliding bar towards the "D" end of the buckle.

PRESSURE POINTS

Indirect pressure can be applied to arteries on several points where the surrounding tissues permit of the artery being pressed against a bone.

The main artery leaving the heart gives off branches to the head and limbs. It is possible to stop the flow of blood in any one of these branches by pressure applied at the correct point either with the thumb or fingers or with a pad and bandage.

PRESSURE POINTS OF THE HEAD

The Facial Artery.—Make pressure with the thumb against the edge of the lower jaw in a slight hollow found two fingers' breadth in front of the angle of the jaw (Fig. 36). Pressure here will check bleeding from the chin, lips, cheek, and outside of the nose.

In dealing with bleeding from the lips or cheek, pressing the inside and outside of the cheek between the forefinger and thumb should be first attempted.

The Temporal Artery.—Make pressure on a point just in front of the upper part of the ear, where this artery can be felt beating. Pressure may be made with the thumb (Fig. 37) or with a pad and bandage, and will help to control bleeding from the temple and forehead.



FIG. 36

DIGITAL PRESSURE ON
FACIAL ARTERY



FIG. 37

DIGITAL PRESSURE ON
TEMPORAL ARTERY

PRESSURE POINTS OF THE UPPER LIMBS

The Artery behind the Collar-bone.—To control bleeding from the upper part of the limb :—

1. Bare the neck and upper part of the chest.
2. Place the patient's arm against the body so as to depress the shoulder, and cause him to incline his head towards the injured side.
3. Using the left hand for the right artery, and vice versa, grasp the neck low down, placing the fingers behind the shoulder and the thumb flat immediately above and behind the middle of the collar-bone in the hollow (salt cellar) above the middle of the bone.
4. Press the thumb downwards against the first rib, which is beneath the collar-bone at this spot (Fig. 38).



FIG. 38

DIGITAL PRESSURE
ON SUBCLAVIAN
ARTERY

The Artery of the Arm is a continuation of the artery beneath the collar-bone, and runs down the arm on the inner side of the muscle in front of the arm. The inner seam of the coat above the elbow roughly indicates its course.

Pressure may be applied on this artery with the fingers or a tourniquet in the upper third of the arm to check bleeding lower in the limb (see Fig. 39).



FIG. 39—DIGITAL PRESSURE ON BRACHIAL ARTERY
Note the taking of the pulse at the wrist

PRESSURE POINTS OF THE LOWER LIMBS

The Artery of the Thigh may be felt beating in the centre of the fold of the groin and may be compressed at this point with the thumbs placed one over the other. When the foot is raised high, the fold in the clothing at the top of the thigh will indicate the groin (Fig. 40).



FIG. 40—DIGITAL PRESSURE ON FEMORAL ARTERY

This artery runs from the middle of the groin to the inner side of the knee, and pressure on it may be made with a tourniquet a hand's-breadth below the groin (Fig. 40).

GENERAL RULES FOR TREATMENT OF WOUND WHEN THE BLEEDING IS SEVERE AND NOT SPURTING ("VENOUS")

1. Place the patient in a suitable position, bearing in mind that blood escapes with less force when the patient sits, and less still when he lies down.
2. If the wound is in a limb, raise the limb unless a bone is broken.
3. Expose the wound, removing whatever clothing may be necessary. Do not disturb any blood-clots.
4. Apply direct digital pressure, except over a fracture or foreign body.
5. Remove any constrictions, such as collar or garters, from the heart side of the wound.
6. Apply a firm bandage round the limb near the wound on the side away from the heart.
7. Remove any foreign bodies, such as broken glass, bits of clothing, hair, which can be seen lying loose in the wound ; do not search for foreign bodies which cannot be seen.
8. If the wound is obviously dirty, and medical aid cannot be procured, wash away as much of the dirt as possible by gently pouring sterilised water over it freely. Never wash the surrounding parts towards a wound.

9. Apply an antiseptic all over the wound and the surrounding skin and cover with a dry dressing.

10. Cover the dressing with cotton wool, lint, or other soft material.

11. Apply a bandage over the dressing firmly ; but if the presence of a foreign body or fracture is suspected, apply it lightly.

12. Support the injured part.

13. Treat shock.

VARICOSE VEINS

Veins are provided with valves which prevent the backward flow of blood, and as long as these valves are in working order a wounded vein bleeds only from the side of the wound further from the heart. Sometimes veins, especially those of the leg, become varicose, that is to say, they become so large that the valves do not act, thus allowing the backward flow of blood. A varicose vein can easily be recognised as it is winding and knotty. Bleeding from a varicose vein may be very serious, but it can quickly be stopped by laying the patient down, raising the limb well above the heart and applying bandages upon, below and above the wound.

BLEEDING FROM THE NOSE (NOSTRILS)

1. Place the patient in a sitting position in a current of air before an open window, with the head thrown slightly back and the hands raised above the head.

2. Undo all tight clothing around the neck and chest.

3. Cause the patient to keep the mouth open, and so lessen breathing through the nose.
4. Apply cold over the nose and also the spine at the level of the collar ; place the feet in hot water.
5. Warn the patient not to blow the nose.

BRUISES

Relief may be given by putting something cold on the bruise, such as ice or a cold compress.

CHAPTER VIII

MISCELLANEOUS INJURIES

SCALDS AND BURNS

A scald is caused by a hot liquid (water, oil, tar, etc.). A burn may be caused by fire, heat, electricity, a strong acid or a strong alkali.

Shock and the entry of harmful germs are the great dangers of burns.

TREATMENT

1. Carefully remove the clothing from the injured parts unless it sticks to the skin, when the adhering portion must be cut around carefully with clean scissors, and left in position.

2. Do not break blisters.

3. Immediately exclude air :—

(a) Place the injured part in water at the temperature of the body (98.4 degrees) until suitable dressings can be procured. A dessertspoonful of baking soda (bi-carbonate of soda) to a pint of warm water will make a soothing lotion, and should be used if available. It will also serve to soak off any clothing adhering to the burn.

(b) Dress the injured parts by applying strips of lint, linen, or gauze, soaked in :—

- (i) A fresh solution of baking soda of similar strength and warmth, keeping them moist until medical aid is obtained ; or in
- (ii) Warm strong tea, allowing them to dry.
- (c) If these are not readily available, proceed as in 4.

4. Cover with cotton wool or similar soft material and bandage lightly.
5. Give fluids freely.
6. Treat shock.

A young child, when severely scalded or burnt, may be placed in a warm bath of the soothing lotion, without removing the clothes, and kept there until medical aid is obtained, care being taken to maintain the temperature of the water at 98.4 degrees. This will lessen shock and pain.

When the face is burnt, cover it with cotton wool, lint, or linen, soaked in the soothing lotion, and keep it moist. Leave a hole for the nose and mouth.

- **When a person's clothing catches fire,** approach him holding a rug, blanket, coat or table-cover in front of yourself for protection. Wrap it round the patient, lay him flat, and so smother the flames.

If a person's clothing catches fire when alone, he should roll on the floor, smothering the flames with the nearest available wrap and call for assistance ; on no account should he rush into the open air.

The use of fire-guards would prevent many calamities.

TREATMENT OF BURNS CAUSED BY A CORROSIVE ACID

1. If it can be obtained quickly, **bathe the part freely with an alkaline lotion**, such as a dessertspoonful of baking soda (bi-carbonate of soda) or washing soda (carbonate of soda) in one pint of warm water. Otherwise thoroughly flood the burnt part with water, warm if immediately available.

2. Treat as a burn.

TREATMENT OF BURNS CAUSED BY A CORROSIVE ALKALI

1. If the burn is caused by quicklime, brush off any that remains on the part.

2. If it can be obtained quickly, **bathe the part freely with an acid lotion**, such as vinegar, lemon-juice or lime-juice diluted with an equal quantity of warm water. Otherwise thoroughly flood the burnt part with water, warm if immediately available.

3. Treat as a burn.

STINGS OF PLANTS AND INSECTS

These give rise to serious inconvenience, and in some cases grave symptoms develop.

TREATMENT

1. Extract the sting if present, preferably with the point of a sterilised needle.

2. Apply freely spirit, sal volatile, a solution of baking soda (bi-carbonate of soda), washing soda (carbonate of soda) or the wet blue bag to relieve pain.

3. Apply a dry dressing.

4. Treat shock.

WOUNDS CAUSED BY A VENOMOUS SNAKE OR RABID ANIMAL

SNAKE BITE

The bite of a venomous snake endangers life and immediate action is necessary to prevent the spread of the venom throughout the body.

TREATMENT

A. If the bite is on a limb—

1. **Immediately** arrest circulation in the limb by means of a **constriction** on the upper arm or thigh (as the case may be) between the wound and the heart. It is useless to place the constriction round the forearm or leg.

The constriction may consist of rubber tubing or elastic braces; or strips of clothing, a tie, handkerchief, or non-elastic braces, placed loosely round the limb and tightened with a stick (as in an improvised tourniquet). The constriction should be kept in position for twenty minutes, then relaxed for one minute or until the skin becomes pink, and again tightened. Repeat this procedure until the arrival of a doctor.

2. Keep the patient absolutely at rest.

3. If the patient is able to swallow, give hot drinks such as strong coffee, tea or milk. Alcohol should be avoided.

4. As the natural alarm of the patient will seriously aggravate the condition, it is of the utmost importance to reassure him with encouraging words.

5. Wash the wound, preferably with a weak (pale pink) solution of permanganate of potash, in order to remove any venom which may have dried on the skin.
6. If breathing is failing, apply artificial respiration.
7. Treat shock.

B. If the bite is elsewhere than on a limb.

Adopt rules 2, 3, 4, 5, 6 and 7 pending the arrival of a doctor.

BITE BY A RABID ANIMAL—HYDROPHOBIA

Hydrophobia is caused by the bite of an animal such as a dog, jackal, fox, or wolf suffering from rabies. The virus travels from the bite along the nerves to the central nervous system, and differs entirely in this respect from snake bite, where the venom is absorbed directly into the veins from the bitten tissues.

TREATMENT

1. After a person has been bitten by a rabid animal or one suspected of having rabies, every effort should be made to promote bleeding so as to wash the wound from within outwards. This is best done by :—

(a) **Immediately** placing a **constriction** (a piece of cord, tape or handkerchief) between the bite and the trunk tightly enough to cause congestion of the limb and ensure bleeding, but not so tightly as to obstruct the arterial circulation in which case the limb becomes pallid, the pulse cannot be felt and bleeding entirely ceases.

(b) Keeping the affected part low ; the upper limb should be allowed to hang down, and in the case of the lower limb the patient should be seated with the foot on the ground.

(c) Bathing the wound with warm water to which crystals of permanganate of potash have been added : the solution should be pale pink in colour.

2. Give alcohol such as brandy or whisky (in the case of an adult two tablespoonfuls or in the case of a child two teaspoonfuls in a wine-glass of water) or hot black coffee.

3. If it is not possible to obtain the services of a doctor **within a few minutes** of the person being bitten, the wound should be cauterised. This is best done by removing the constriction and applying a fluid caustic, such as carbolic or nitric acid on a match or a piece of wood cut to a point, or lunar caustic. To prove effective, every tooth mark must be probed and cauterised separately, as only by so doing can the virus be destroyed.

If more than half-an-hour has elapsed since the person has been bitten, proceed as in Rules 1 and 2, and then remove the constriction, but do not cauterise the wound.

4. Apply a dry dressing and retain it in position with a bandage.

5. Treat shock.

GRIT, ETC., IN THE EYE

1. Prevent the patient from rubbing the eye, tying down a child's hands if necessary.

2. Pull down the lower eyelid, when, if the grit is seen, it can be removed with a camel-hair brush or with the corner of a handkerchief twirled up and wetted with clean water.

3. When the grit is beneath the upper eyelid, lift the lid forward, push up the lower lid beneath it and let go. The lashes of the lower lid brush the inner surface of the upper one, and may dislodge the grit. If the grit is not removed after a few attempts, get a doctor's help as soon as possible.

4. When anything is fixed in the eyeball do not try to remove it, but drop a little medicinal paraffin or castor oil on the eyeball after pulling down the lower eyelid ; close the lids, apply a soft pad of cotton wool and secure it by a bandage tied sufficiently firmly to keep the eyeball steady ; take the patient to a doctor.

5. When quicklime is in the eye, brush away as much of it as possible. If it can be obtained quickly, bathe the eye freely with an acid lotion, such as vinegar and cold water (one part in four). Otherwise thoroughly flood the eye with cold water.

CHAPTER IX

RESPIRATION (BREATHING)

Before considering how to treat a suffocated person, it is necessary to understand what breathing is.

The organs of breathing are the two lungs and the air passages. The lungs are situated in the chest, which is surrounded by the ribs, and is separated from the abdomen by a muscular partition called the diaphragm. The air passages are the nostrils (or mouth), the throat and tubes leading to the right and left lungs.

Breathing consists of two acts : inspiration, when air is drawn into the lungs, and expiration, when air is forced from the lungs. During inspiration the ribs, which are hinged to the spine and work like the handle of a bucket, are raised and the arch of the diaphragm is flattened, thus enlarging the chest and drawing air through the air passages into the lungs. In expiration this process is reversed.

As the blood depends upon air for its purification and the oxygen necessary to maintain life, interference with breathing very soon may produce a dangerous state called **asphyxia**, examples of which are afforded by drowning, suffocation, choking, etc.

It should not, however, be assumed that the patient is dead because breathing is not apparent. Prompt steps should be taken to **ensure that breathing is possible**, *i.e.*, that the air passages are not obstructed, that pressure

does not present the necessary expansion of the chest and that there is an abundance of pure air.

If natural breathing is seen to be failing or cannot be discerned, artificial means of restoring it must be resorted to at once as follows :—

ARTIFICIAL RESPIRATION SCHAFER'S METHOD

1. Adjust the Patient's Position.—At once lay the patient in a prone position (*i.e.*, back upwards), with arms extended above the head, and his head turned to one side, so as to keep his nose and mouth away from the ground (Fig. 41). Do not waste time by loosening clothing ; no pad is to be placed under the patient, nor need the tongue be drawn out, as it will fall naturally towards the lips.

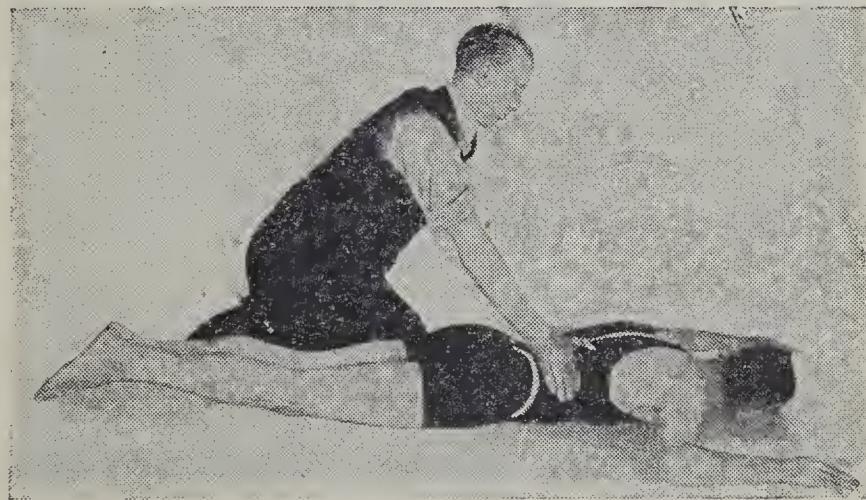


FIG. 41—ARTIFICIAL RESPIRATION
(Schafer's Method)

To turn the patient to the prone position, stoop at his side, place his arms close to the body, cross his far leg over his near leg, and, protecting his face with one hand, with the other grasp the clothing at the hip on the opposite side of the body and pull smartly over.

2. Imitate the Movements of Breathing.

(a) *Induce Expiration.*—Kneel at one side of the patient, facing his head and sitting on your heels (Fig. 41). Place your hands on the small of the patient's



FIG. 42—ARTIFICIAL RESPIRATION (Schafer's Method)

back, their lower edges just clearing the top of the pelvis, the wrists nearly touching, the thumbs as near each other as possible without strain, and the fingers passing over the loins on either side and pointing towards the ground but not spread out (Fig. 42). Bending your body from the knees and somewhat straightening the hip-joints, swing slowly forward keeping your arms quite straight and rigid so that the weight of your body is conveyed to your hands directly downwards (Fig. 43). No exertion is required ; the necessary pressure is imparted by the weight of your body. In this way the patient's abdomen is pressed against the ground ; the abdominal organs are forced against the diaphragm ; the diaphragm rises and air is driven out of the lungs together with any water or mucus which

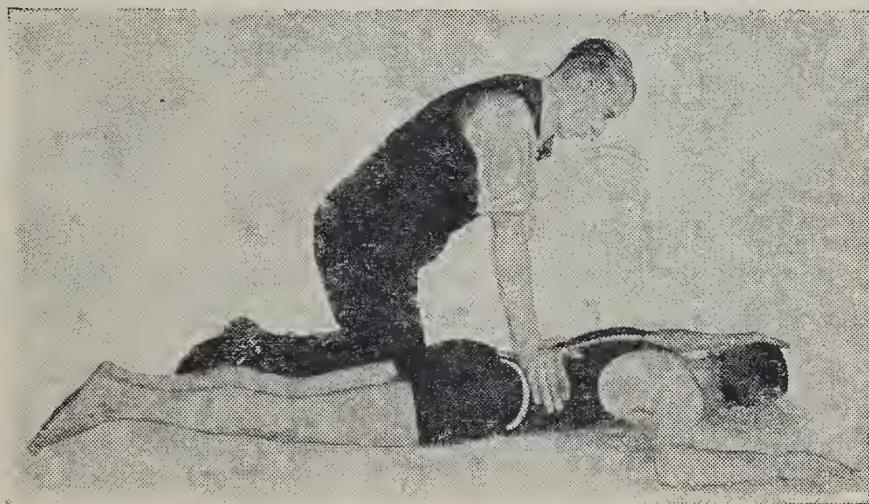


FIG. 43—ARTIFICIAL RESPIRATION (Schafer's Method)

may be present in the air passages or in the mouth, producing **Expiration**.

(b) *Induce Inspiration*.—Swing your body slowly backwards to its first position, thus removing the weight from the hands (which are kept in position) and relaxing the pressure on the abdomen (Fig. 41).

The organs now assume their former position, the diaphragm descends, the thorax is enlarged and air passes into the lungs, producing **Inhalation**.

(c) *Alternate these movements* by a rhythmic swaying forwards and backwards of your body from the knee joints, twelve times a minute. The rhythm is—pressure two seconds and relaxation three seconds.

When natural breathing begins, regulate the movements of artificial respiration to correspond with it, and promote circulation by rubbing the limbs vigorously towards the heart and by applying warmth.

Watch the patient carefully for some time to see that the breathing does not fail; if it does, at once resort again to artificial respiration.

Artificial respiration must be continued perseveringly until respiration is restored or until a doctor pronounces life to be extinct.

CHAPTER X

INSENSIBILITY

Insensibility or unconsciousness is due to some cause which has thrown the brain out of working order. As the brain controls all the actions of the body, insensibility is therefore a grave danger to the patient.

Observance of the following simple rules will prove sufficient in the majority of cases of insensibility.

GENERAL RULES FOR TREATMENT OF INSENSIBILITY

1. If the patient is not breathing, perform artificial respiration.
2. If the patient is breathing, lay him on his back ; turn his head to one side. If his face is pale there is not enough blood in his head ; therefore keep his head low and raise his feet. If his face is red or dusky there is too much blood in his head ; therefore raise his head and shoulders.
3. Undo all tight clothing about the neck, chest and waist.
4. Ensure an abundance of pure air. Open windows and doors ; keep back a crowd ; remove from harmful gases or impure atmosphere.
5. If bleeding is seen, stop it.
6. Obtain a doctor's help as soon as possible.

7. Carefully examine the patient for signs of injury. Do not waste time by attending to small injuries, but treat the insensibility.

8. Give no food or fluids whatever by the mouth while the patient is insensible.

9. Unless unavoidable, never leave the patient until you have placed him in the charge of a responsible person.

10. Persuade a person who has been insensible not to resume work until he has been seen by a doctor.

SUFFOCATION (ASPHYXIA)

When a patient is insensible and not breathing, he is said to be "suffocated."

Suffocation may be brought about by drowning, strangling, hanging, choking, swelling about the throat, inhaling poisonous gases, crushing, and certain conditions which make the muscles of the chest unable to raise the ribs. The rules for making breathing possible are :—

1. Remove the cause of the suffocation, or the patient from the cause.

2. Ensure that the air passages are not blocked, that nothing presses on the chest, and that there is an abundance of pure air.

3. Perform artificial respiration.

ADDITIONAL TREATMENT IN SPECIAL CASES

STRANGLING

Cut and remove the band around the throat.

HANGING

Do not wait for a policeman but grasp the lower limbs and raise the body to slacken the rope; cut the rope and free the neck.

CHOKING

To dislodge the obstruction in the throat, bend the head and shoulders forward and thump the back hard between the shoulder blades. If this is unsuccessful, open the mouth, forcibly if need be; pass two fingers right to the back of the throat to encourage vomiting.

SWELLING ABOUT THE THROAT

If possible, lay the patient before a fire. Apply a hot compress to the front of the neck from the chin to the top of the breast-bone. Renew the hot compress frequently. If breathing has not ceased or has been restored, give ice to suck, or failing ice, cold water to drink. Butter, olive oil or medicinal paraffin may also be given.

SUFFOCATION BY SMOKE

Before entering a building or room full of smoke, tie a handkerchief, wet if possible, over the nose and mouth. Keep low, and quickly but cautiously drag the patient out.

SUFFOCATION BY POISONOUS GAS

On entering any enclosed space known or suspected to contain poisonous gas of any kind, ensure a free circulation of air by opening or breaking doors and windows.

Hold your breath, keep low, and remove the patient as quickly as possible.

In cases where ventilation is not possible and the character of the gas is known to be deadly, a suitable gas mask should be worn.

CONVULSIONS

When convulsions are present, support the patient's head, and after wrapping a piece of wood or any other hard material in a handkerchief, hold it in his mouth to prevent biting the tongue. Do not forcibly restrain his movements, but prevent him from hurting himself by pulling him away from a source of danger, such as machinery a wall, or fireplace. Light pieces of furniture should be pushed out of the way.

CONVULSIONS IN BABIES

SPECIAL TREATMENT

1. Strip the child and support it in a hot bath so that the water covers the whole of the body up to the neck, and keep it there until the convulsions have ceased or the doctor arrives. Keep a sponge frequently dipped in cold water on the top of the head as long as the child is in the bath.
2. On removal from the bath, wrap the child in a warm blanket, but still keep the head cool.
3. If the convulsions recur, repeat the treatment.
4. Adopt the general rules for treatment of insensibility as far as applicable.

SUNSTROKE

As a result of exposure to the sun in very hot weather, sunstroke may develop. The skin becomes dry and

burning, the face very flushed and sickness, giddiness, faintness, thirst, and difficulty in breathing may be experienced.

SPECIAL TREATMENT

1. Remove the patient to a cool shady place and strip him to the waist.
2. Lay him down with the head and shoulders well raised.
3. Fan him vigorously.
4. Sponge the body with cold water continuously and apply ice bags or cold water freely to the head, neck and spine.
5. On return to consciousness, give drinks of cold water freely.
6. Adopt the general rules for treatment of insensibility as far as applicable.

CHAPTER XI

TRANSPORT OF INJURED PERSONS

Note.—Juveniles practising methods of transport should only use persons of their own age and physique as patients. Adults must not be carried by juvenile students of the Preliminary Course.

THE FOUR-HANDED SEAT

This seat is used when the patient can assist the bearers by using one or both arms.

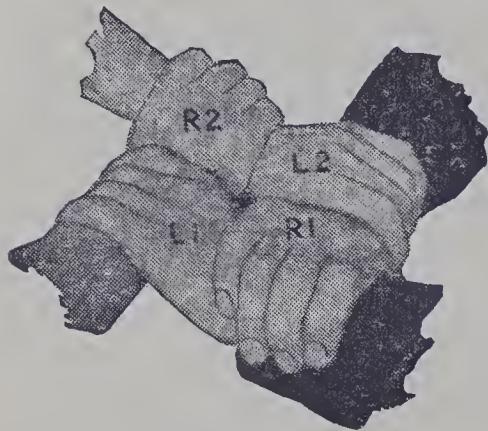


FIG. 44

GRIP FOR FOUR-HANDED SEAT

1. Two bearers face each other behind the patient and grasp their left wrists with their right hands and each other's right wrists with their left hands (Fig. 44) and stoop down.

2. The patient is instructed to place one arm round the neck of each bearer so that he may raise himself to sit on their hands and steady himself during transport.

3. The bearers rise together and step off, the bearer on the right-hand side of the patient with the right foot, and the left-hand bearer with the left foot.

THE TWO-HANDED SEAT

This seat is mostly used to carry a patient who is unable to assist the bearers by using his arms.

1. Two bearers face each other and stoop (not kneel) one on each side of the patient. Each bearer passes his forearm nearest to the patient's head under his back just below the shoulders, and, if possible, takes hold of his clothing. They slightly raise the patient's back, and then pass their other forearms under the middle of his thighs (Fig. 45), and clasp their hands, the bearer on the left of the patient with his palm upwards and holding a folded handkerchief to prevent hurting by the finger nails ; the bearer on the right of the patient with his palm downwards, as shown in Fig. 46 (" Hook-grip ").



FIG. 45
TWO-HANDED SEAT



FIG. 46
METHOD OF FORMING "HOOK-GRIP"
(Front View)

2. The bearers rise together and step off, the right-hand bearer with the right foot, and the left-hand bearer with the left foot.

In all cases of carrying by Hand Seats, the bearers walk with the cross-over step and not by side paces.

STRETCHERS (*for Males only*)

Boys of unsuitable age or physique will not be expected to carry a loaded stretcher, but should be instructed in these exercises so that they may direct others when the need arises.

The "Furley" Stretcher consists of the poles with handles, traverses (which keep the poles apart), runners, a canvas bed fitted with pillow sack, and slings with transverse straps.

STRETCHER EXERCISES FOR FOUR BEARERS

1. **The Instructor** selects the bearers and numbers them 1, 2, 3, 4 at his discretion. Should one man be taller and stronger than the others, he should be No. 4, as he will have to bear the heavier part of the burden. All orders will be given by No. 1.

2. "**Stand to Stretcher.**"—No. 2 places himself on the left of the stretcher, with his toes in line with the front end

of the poles; No. 4 behind No. 2, with his heels in line with the rear end of the poles; No. 1 places himself on the right of the stretcher in line with No. 2, and No. 3 behind No. 1 in line with No. 4 (Fig. 47). (These are their "permanent" positions).



FIG. 47

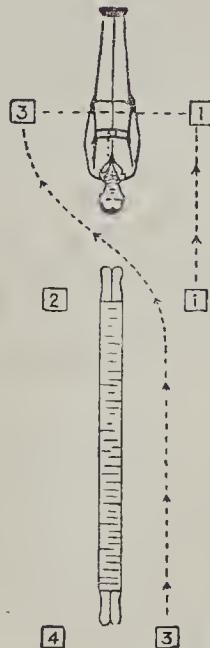
STAND TO
STRETCHER

FIG. 48

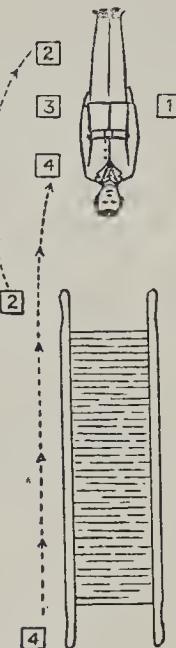
PREPARE
STRETCHER

FIG. 49

PREPARE FOR
LOADING

3. **"Lift Stretcher."**—Nos. 2 and 4 stoop, grasp both handles of the poles firmly with the right hand, rise together, holding the stretcher at full extent of the arm, runners to the right.

4. "**Collect Wounded.**"—The squad will double by the shortest route to the patient, the leading bearers halting three paces from the head of and in line with the patient.

5. "**Lower Stretcher—Prepare Stretcher.**"—No. 1 proceeds to the right and No. 3 to the left of the patient, halting at his hips, and prepare him for removal (Fig. 48); Nos. 2 and 4 turn to the right, kneel on the left knee, unbuckle the transverse straps and place the slings on the ground beside them, separate the poles and straighten the traverses; then each takes up a sling, doubles it on itself, slips the loop thus formed on the near handle, and places the free ends over the opposite handle, buckle uppermost. They then rise, test stretcher, arrange blankets as in Figs. 50 and 51, and proceed to the patient, taking up their positions, No. 2 opposite his knees, and No. 4 opposite his shoulders, as in Fig. 49, unless otherwise directed by No. 1.*

6. "**Load Stretcher.**"—The bearers, turning inwards together and kneeling on the left knee, will, with the exception of No. 4, pass their hands beneath the patient. (When lifting the patient from his right side, the bearers will kneel on the right knee). No. 2 supports the legs, Nos. 1 and 3 (joining hands by the "Hook-Grip") the thighs and hips, No. 4 the upper part of the trunk, passing his left hand across the patient's chest and grasping his right shoulder, and his right arm beneath the left shoulder supporting the head (Fig. 53). In lifting the patient off the ground, special care must be taken of the injured part, No. 1 giving the necessary instructions.

***NOTE.**—The position of the stretcher and of the bearers will be modified at the discretion of No. 1, who will be governed by the nature of the patient's injury or the surroundings.

"BLANKETING" A STRETCHER

There are two blankets "A" and "B," the three equal parts of each being marked A.1, A.2, A.3, and B.1, B.2, B.3. *Blanket A* is folded with its middle third A.2 over the stretcher, and one third hanging down on each side A.1 and A.3; *Blanket B* has two thirds, B.2 and B.3, hanging down on the same side.

There are now two thicknesses of blanket on the stretcher.

A.1 is folded over B.1; A.3 remains hanging; B.2 is folded over A.1—B.3 comes right over and hangs down on the opposite side, with its centre fold B.2 over A.1.

There are now four thicknesses of blanket on the stretcher.

The patient will be laid on the four thicknesses of blanket, and two thicknesses A.3 and B.3 will be folded over him.

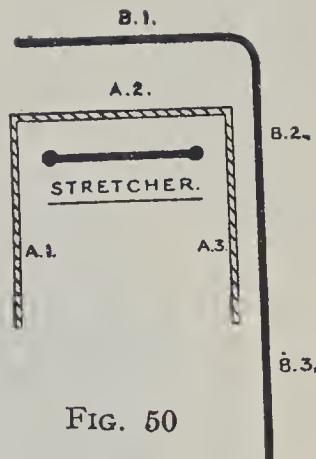


FIG. 50

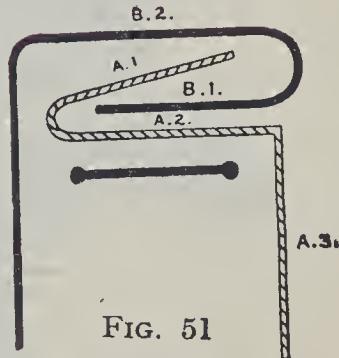


FIG. 51



FIG. 52

7. "**Lift.**"—The patient will be carefully lifted on to the knees of Nos. 2, 3 and 4 (Fig. 54). No. 1 will then disengage, rise, turn to his left, double to the stretcher, take hold of it, left hand across, resting the near pole on his left hip, return to the patient and place the stretcher directly beneath him (Fig. 55); then stand up and return to his former position, kneel on his left knee, join hands with No. 3, and assist in lowering the patient.



FIG. 53
READY TO LIFT PATIENT

8. "**Lower.**"—The patient is lowered slowly and gently on to the centre of the stretcher, special care being taken of the injured part (Fig. 56). The bearers then disengage, cover the patient with the two folds of blanket (A.3 and B.3, Fig. 52), rise, turn to the foot end of the

stretcher, and resume their permanent positions (unless otherwise directed by No. 1), thus: Nos. 1 and 2 step forward and No. 4 steps back; No. 3 takes a side pace to the left, turns about and proceeds round the head end of the stretcher to his place on the right of the stretcher.



FIG. 54
LIFTING PATIENT

9. "**Lift Stretcher.**"—Nos. 2 and 4 stoop, grasp the doubled sling midway between the poles with the right hand, and sweep it off the handles, rise, holding it at full length of the arm, buckle to the front. They then take a



FIG. 55
PLACING STRETCHER

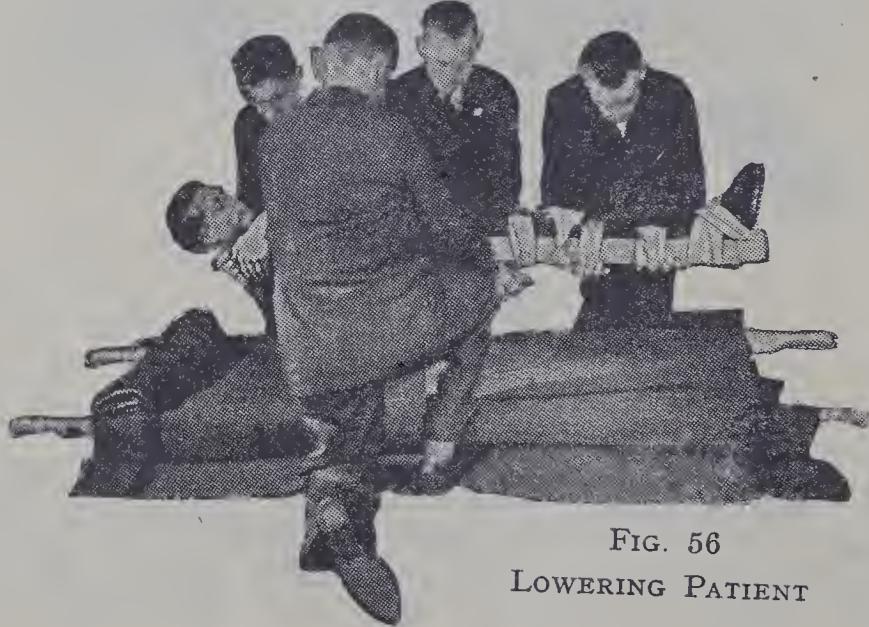


FIG. 56
LOWERING PATIENT

side pace between the handles, and place the sling over the shoulders, dividing it equally, buckle to the right. The sling should lie well below the collar of the coat behind, and in the hollow of the shoulders in front. They stoop, slip the loops over the handles, commencing with the left and grasp both handles firmly. No. 1 will then ensure that they rise slowly together, lifting the stretcher, No. 4 conforming closely to the movements of No. 2.

10. "**Adjust Slings.**"—Nos. 1 and 3 will turn to the left and adjust the slings of Nos. 2 and 4, and resume their permanent positions. No. 3 will collect any property belonging to the patient and, if practicable, place it on the stretcher.

11. "**Advance.**"—The bearers move off together, with

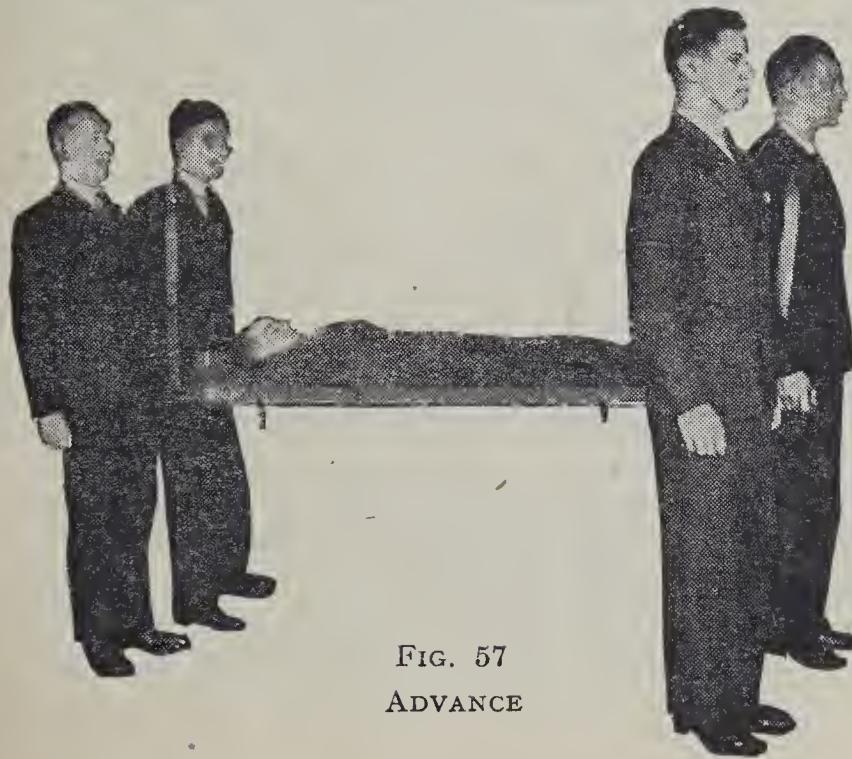


FIG. 57
ADVANCE

a step of 20 inches, No. 4 stepping off with his right foot, the remainder of the bearers with the left foot, Nos. 2 and 4 bearers keeping their knees bent and raising their feet as little as possible.

12. "**Halt.**"—The bearers halt.

13. "**Lower Stretcher.**"—Nos. 2 and 4 slowly stoop and place the stretcher gently on the ground (No. 4 conforming to the movements of No. 2), slip the loops from the handles and stand up. They remove the slings from the shoulders, hold them as described in Order 9, take a side pace to the left, and stand to stretcher. They then place the slings on the handles (as in Order 5) and rise together.

14. "**Unload Stretcher.**"—The bearers will place themselves as described for loading in Order 6.

"**Lift.**"—The patient, in the blankets, is lifted as described for loading.

No. 1 grasps the stretcher as described for loading, and, lifting it clear of the patient, carries it forward three paces clear of the patient's feet. He then rejoins the bearers, kneels on his left knee, joins hands with No. 3, and assists in lowering the patient to the ground. The bearers rise and resume their "permanent" positions.

15. "**Close Stretcher.**"—Nos. 2 and 4 turn to the right, kneel on the left knee, remove the slings and place them on the ground beside them, push in the traverses, raise the canvas, and approximate the poles; they then rise, lifting the stretcher, and face one another; place the handles of the poles between their thighs, runners to the right and fold the canvas to the right, lightly on the

poles. Each takes up a sling and passes the buckle end to the other, and, holding the buckle end in the left hand, threads the transverse strap through the loop of the other sling, and buckles it tightly close to the traverse bars, keeping the sling on top. Then, grasping both handles in the right hand, back of hand to the (original) right, they turn to the (original) right in a slightly stooping position, rise and turn to the left together. Nos. 1 and 3 take a side pace to the left.

IMPROVISED STRETCHERS

Stretchers may be improvised as follows :—

1. Turn the sleeves of two or three coats inside out and pass two strong poles through them ; button the coats. The poles may be kept apart by strips of wood lashed to the poles at both ends of the bed formed by the coats.

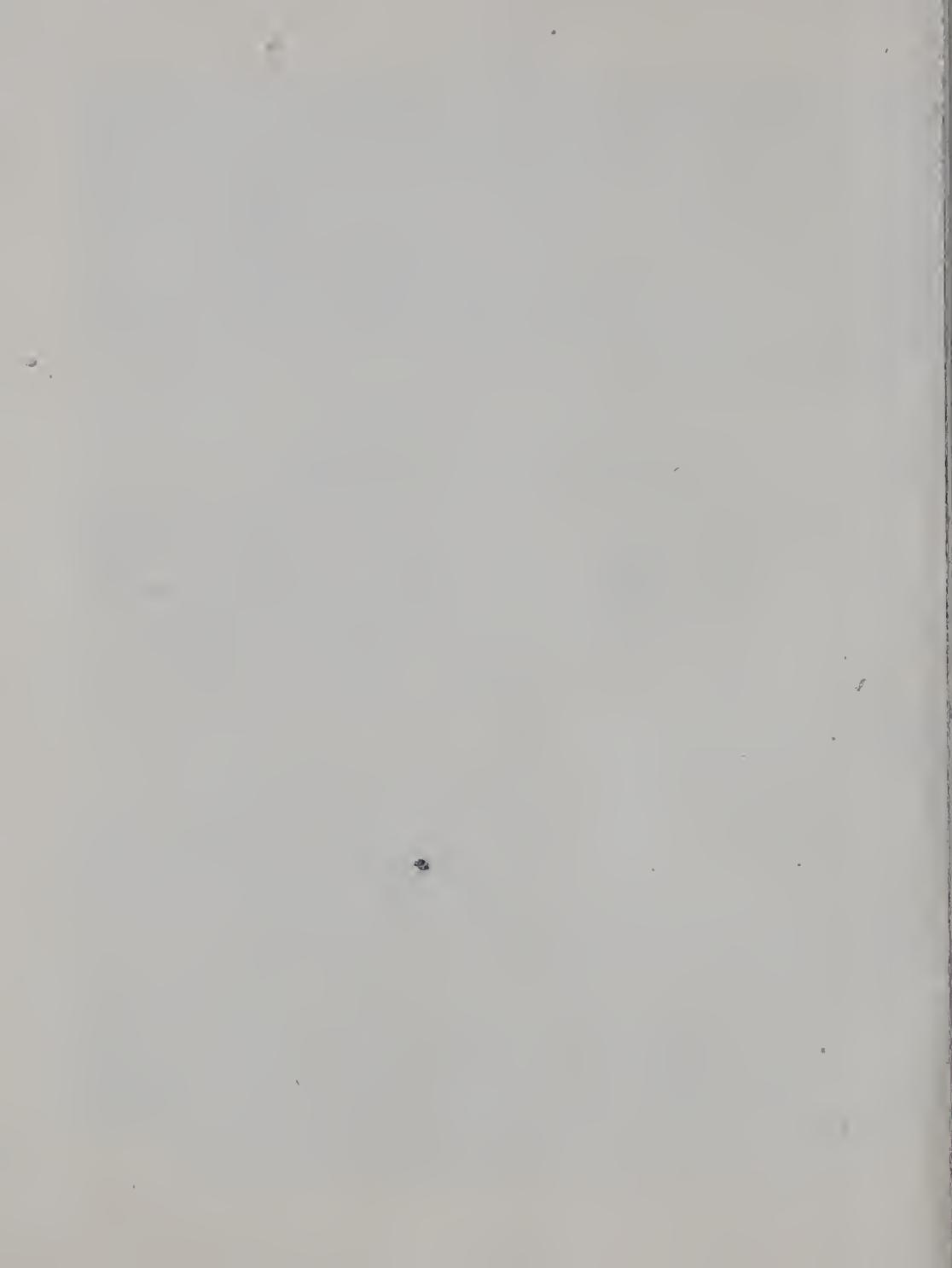
2 Make holes in the bottom corners of one or two sacks and pass stout poles through them, keeping the poles apart as in 1.

3. Tie broad bandages at intervals to two poles.

4. Spread out a rug, piece of sacking, tarpaulin, or a strong blanket, and roll two stout poles up in the sides. Two bearers stand on each side and grasp the middle of the covered pole with one hand, and near the end with the other. They walk sideways.

5. A hurdle, broad piece of wood, or shutter may be used ; rugs, clothing, hay, straw, etc., should be placed on it, and covered with a piece of stout cloth or sacking. The latter is useful in taking the patient off the stretcher.

Always test an improvised stretcher before use.



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